A Thermo-optic multimode interference switch structure based on vinyltriethoxysilane (VTES) hybrid organic-inorganic sol-gel

Abstract

A vinyltriethoxysilane (VTES) based hybrid organic–inorganic sol–gel is synthesized and characterized for its abilities in optoelectronic applications. The resulted hybrid material, which is known as VTT, is fabricated as a thin film structure under controlled environment. The film thickness for various coating speeds and refractive index are measured by the method of prism coupling. Based on the film characterization results, a 2 × 2 multimode interference photonic switch structure based on thermal controlling effect is proposed. A ridge waveguide of VTT in silica clad is used as a design structure. The switching characteristics due to changes in effective index are analyzed by the two-dimensional finite difference beam propagation method with transparent boundary condition. The proposed structure works well with low crosstalk level of -28 dB and low switching power relatively to the structural upper cladding thickness.